

24. FOULING ORGANISMS ON FIBREGLASS COATED HULL OF A BOAT IN AN ESTUARINE ENVIRONMENT

(With two text-figures)

Fouling organisms collected from the fibreglass coated hull of the research vessel MLV TARINI which was used in an estuarine environment for 9 months from May 1970 to February 1971, revealed the nature and extent of settlement and the abundance of fouling fauna in the estuarine environment.

INTRODUCTION

This study deals with the settling of fouling organisms on the submerged portion of the fibreglass coated wooden hull of the research vessel MLV TARINI of the National Institute of Oceanography, at Panjim, Goa. While the 15 m boat was in dry dock at Bombay, about 21 sq m area of its wooden hull was coated with fibreglass sheathing up to about 15 cm above the water line. The submerged portion of the hull formed about 18 sq m of the area. After making the boat sea worthy and equipped for oceanographic work, it was launched in early May 1970 and was brought to Panjim immediately for use in oceanographic studies in estuarine and nearshore waters of Goa region. The boat moved little during the peak southwest monsoon period from June to September, when it was anchored along-side a cement concrete jetty on the Mandovi estuary. From September to February the boat was extensively used in the estuarine and near shore waters of Goa. During the period a heavy settlement of fouling organisms was noted on the hull of the boat which necessitated scrapping in dry dock. This offered a chance to study the settlement of fouling communities on the fibreglass coated hull of the vessel which was used in an estuarine environment for nine months.

METHODS

Random samples in duplicate, each representing a unit area of 1 sq m were scrapped from the bow, stern, starboard and port sides. Wet weight and volume of each sample was recorded. The constituents were sorted, identified as far as possible up to species, and were weighed separately to estimate their percentage composition.

OBSERVATIONS AND COMMENTS

Experimental reports on the settling of fouling organisms on various wooden materials as well as those with different protective coat-

ings are numerous from different environments *in situ* (Kuriyan 1952; Nagbhushanam 1960; Nair 1961; Nair 1965; Balasubramaniyan *et al.* 1968; Karande 1969 and Balasubramanyan 1971). However, nothing is known about fouling organisms in the estuarine and nearshore waters around Goa.

The average weight of settlement per square metre was highest on the starboard side (600.80 gm/sq m) of the submerged portion of the hull, whereas the portside of the hull harboured second highest weight of settlement (439.70 gm/sq m). The stern side and bow side indicated average weight of settlement as 251.50 gm/sq m and 189.40 gm/sq m respectively.

An approximation of values of average settlement per sq m on different sides of the hull gives an average total settlement of about 1983 Kg of fouling organisms on 18 sq m submerged area of MLV TARINI in nine months from May 1970 to February 1971.

All the major fouling organisms namely cirripedes, molluscs, annelids, bryozoans, coelenterates as well as their associates were encountered in the samples collected from the hull.

Among the fouling organisms, the barnacles (cirripedia) were most abundant (Fig. 2B) and their percentage of composition all over the hull, was consistently high and varied from 53.63 per cent to 66.59 per cent per sq. m (Fig. 1). The settlement was so intense that the barna-

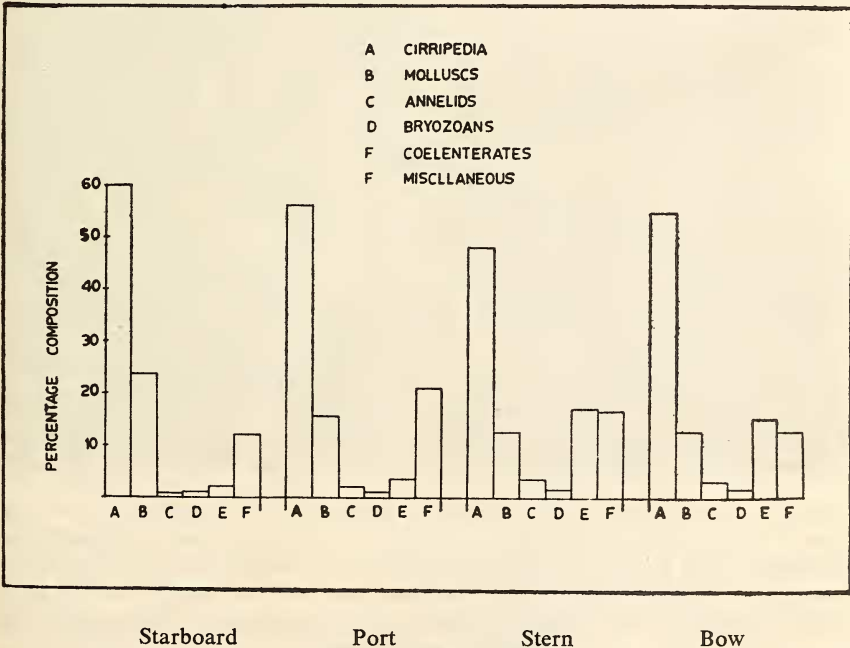


FIG. 1. Diagrams showing the percentage composition of various fouling organisms on different sides of the hull of MLV TARINI.

cles were observed to have grown in 3 tiers or more, with the basal layer of dead shells. Another interesting feature was, the observed preference of site by bigger barnacles, *B. tintinnabulum tintinnabulum* which were congregated on the stern side whereas they were totally absent on other sides of the hull.

The molluscs, by their percentage ranging between 13.79 per cent and 26.57 per cent per sq m were second highest in composition on all the sides of the hull. The occurrence of shell settlement was highest on starboard side compared to that on portside. (Fig. 1). The starboard side being always exposed, offers an easily accessible surface for settlement than the sheltered portside. Oysters and mussels were the main molluscan foulers (Fig. 2C).

The oysters were observed to settle on barnacle shells and not directly on the surface of the hull. Mussels occupied the major portion of the submerged surface, mainly because of their entangling byssus apparatus which, in turn harbours associates such as amphipods, isopods and crabs. Few specimens of *Scapharca* and *Martesia*, were also observed.

Annelids and Bryozoans formed a minor component of the fouling fauna and were found in consistently low percentage ranging

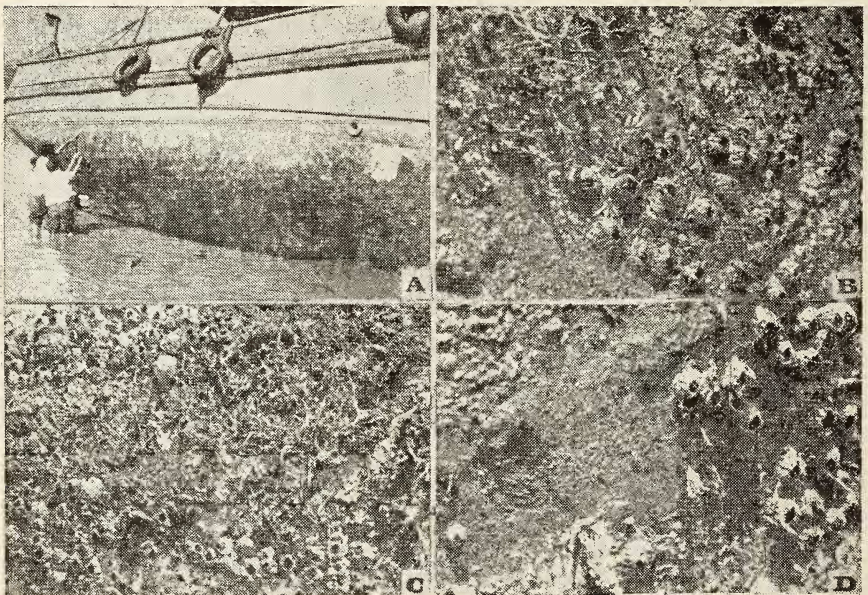


FIG. 2. A. General view of the fouling on the hull of MLV TARINI; B. Close up view of the starboard side hull of MLV TARINI showing settlement of barnacles, hydrozoans and bivalves; C. Close up view of the portside hull of MLV TARINI showing branches, crab, hydrozoans and annelids; D. Close up view of the bow side of the hull of MLV TARINI showing early settlement of cirripeds along with branacles and annelids.

between 0.86%-4.06% and 0.99%-1.86%, respectively. Sessile forms dominating among the annelid-bryozoan component.

Coelenterates, especially hydrozoans appear to be a major fouling element in Goa waters as their settlement was dense and rich at places (Fig. 2D).

Of special interest is the selectivity of the hydrozoan settlement largely on the bow and stern sides as indicated by markedly high percentage of their occurrence in these area, (77% per sq m at stern and 16.1% per sq m at bow) compared to that on the side flanks (Fig. 1). Maximum turbulence at the stern area due to propeller action and the action of the current due to cutting of water at the bow area appear to be conducive factors for such predominant settlement on specific sites.

Hydrozoans are reported (Karande 1969) to cause considerable damage to the protective coating on the hull of the boats. However, the fibreglass coating on the hull of MLV TARINI did not show any apparent deterioration whatsoever.

Miscellaneous components consisting of animal associates, viz. amphipods, isopods, decapods and algal matter were found scattered along with ample silt and debris on all sides of the hull, and formed 13 per cent to 23 per cent per sq m of the average settlement. The highest concentration of miscellaneous constituents was recorded on the portside. The high percentage of miscellaneous constituents were probably the result of heavy precipitation in the waters of estuarine environment in Goa region (Dehadrai 1970). Passive settlement of silt and detritus which is characteristic of estuarine environment may not be considered among the fouling organisms, but it is of consequence as it thus enlarge the burden by constituting a sizeable part of the total settlement on the hull of the boat.

LIST OF FOULING SPECIES

CIRRIPEDIA

1. *Balanus amphitrite communis*
2. *B. a. variegatus*
3. *B. tintinnabulum tintinnabulum*

MOLLUSCS

4. *Ostrea madrasensis*
5. *Mytilus viridis*
6. *Modiolus trailli*
7. *Martesia* sp.
8. *Scapharca* sp.

ANNELIDS

9. *Hydroides* sp.
10. *Sabellid* sp.

11. *Spirobis* sp.

COELENTERATES

12. *Anemonia indicus*
13. *Cribrinopsis robertii*
14. *Actinia* sp.
15. *Sertularia* sp.
16. *Pennaria* sp.

BRYOZOANS

17. *Membraniopora* sp.
18. *Acanthodesia* sp.
19. *Electra* sp.
20. *Bugula* sp.

ISOPODS

21. *Ligia exotica*

AMPHIPODS

22. *Gammarus* sp.

DECAPODS

23. *Dotilla myctiroides*

24. *Uca* sp.

ALGAE

25. *Enteromorpha* sp.

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25. THE GENUS *DELIAS* HUBN. FROM THE PLAINS OF ASSAM

I was interested to read Messrs Varshney & Nandi's note [69(3): 667-668] regarding the absence of the genus *Delias* from the plains of In-